

REMARKS

Claims 1-18 are all the claims pending in the application. New claims 15-18 have been added to further define the invention. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claim 12 under §112, 2nd paragraph, as indefinite. Specifically, the Examiner asserted that the recitation of a "portion shaped like a rectangle in section and having two or more optical path changing slopes" is internally inconsistent. The Examiner suggested changing "rectangle" to --trapezoid--. Applicants have followed the Examiner's suggestion. Also, Applicants have amended the paragraph bridging pages 16 and 17 in the specification to refer to a --trapezoid-- instead of a "rectangle", so that it is consistent with the paragraph on page 18.

Claim Rejections - 35 U.S.C. § 102

- The Examiner rejected claims 1 and 2 under §102(e) as being anticipated by US Patent 6,147,725 to Yuuki et al. (hereinafter Yuuki). Applicants respectfully traverse this rejection because Yuuki fails to disclose every element as set forth and arranged in Applicants' claims.

Claim 1 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, a light source disposed on at least one side surface of the liquid-crystal display panel, and an optical path changing sheet disposed on a back side of the liquid-crystal display panel.

For example, as shown in Figs 1 and 2, one embodiment of the invention includes a liquid-crystal display device comprising a transmission type liquid-crystal display panel L including a liquid-crystal cell 70, a light source 91, 93 disposed on at least one side surface of the liquid-crystal display panel L, and an optical path changing sheet 11 disposed on a back side of the liquid-crystal display panel L.

Because the light source is disposed on a side surface of a liquid-crystal display panel, the optical path of the transmission light is changed efficiently toward a visual side of the panel through an optical path changing sheet disposed on the back of the panel. And the optical path changing sheet is excellent in thickness. Hence, the transmission light can be utilized for liquid-crystal display, and a liquid-crystal display device which is excellent in thickness and weight and which is bright and excellent in display quality can be formed.¹ Further, because the light source is disposed on at least one side surface of the liquid-crystal panel, increase in volume and weight—due to a light pipe—is avoided so that reduction in thickness and weight is achieved by the invention.²

In contrast to that set forth in claim 1, Yuuki discloses a light source 13 that is disposed on a side surface of a light guide plate 11. See Fig. 3, for example. Light from the light guide plate 11 is then directed upward, as shown in Fig. 3, to the TFT panel 21 of the liquid-crystal display panel. This arrangement is similar to that in Example 7 set forth in the present specification. While such an arrangement provides good frontal luminance, it also includes a remarkable increase in thickness. Note the present specification at page 39, lines 1-14. Therefore, Yuuki fails to disclose a light source disposed on at least one side surface of a liquid-crystal display panel, as set forth in claim 1.

For the above reasons, claim 1 is not anticipated by Yuuki. Likewise, dependent claim 2 is not anticipated by Yuuki.

- The Examiner rejected claims 1, 13, and 14 under §102(b) as being anticipated by US Patent 5,712,694 to Taira et al. (hereinafter Taira). Applicants respectfully traverse this rejection because Taira fails to disclose every element as set forth in Applicants' claims.

¹ Specification at paragraph bridging pages 2 and 3.

² Specification at paragraph bridging pages 39 and 40. See also, the specification at: page 13, lines 4-11; page 14, lines 21-25; page 28, lines 9-13; and page 38, line 7 - page 39, line 14.

Again, as noted above, claim 1 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel.

In contrast to that set forth in claim 1, Taira discloses a light source 101 disposed on a side surface of a light guide plate 103. See Figs. 2, 14, and 15. Light 112 emitted from the top of the light guide plate 103 is then made incident on a liquid-crystal panel. See Taira at: Fig. 2; col. 1, lines 45-50; col. 2, lines 20-27; col. 8, lines 14-16, 49-50; col. 14, lines 16-21; and col. 15, lines 3-6. That is, Taira discloses an arrangement similar to that in Example 7 of the present specification. Therefore, Taira fails to disclose a light source that is disposed on at least one side surface of a liquid-crystal display panel, as set forth in claim 1.

For the above reasons, claim 1 is not anticipated by Taira. Likewise, dependent claims 13 and 14 are not anticipated by Taira.

Claim Rejections - 35 U.S.C. § 103

- The Examiner rejected claims 7-10 under §103(a) as being unpatentable over Taira. Applicants respectfully traverse this rejection because Taira fails to establish *prima facie* obviousness in that it does not teach or suggest every element as set forth in the claims.

Again, claim 1 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel.

As noted above, Taira fails to disclose a light source that is disposed on at least one side surface of a liquid-crystal display panel, as set forth in claim 1. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to change angles of repetitive prismatic structures disclosed by Taira.³ But neither the Examiner nor Tara sets forth any teaching or suggestion of placing a light source on at least one side surface of a liquid-crystal

³ Office Action at page 6, item 4, 2nd to 4th paragraphs.

display panel. Therefore, *arguendo*, even assuming one of ordinary skill in the art were motivated to modify Taira as suggested by the Examiner, such would still not teach or suggest every element as set forth in Applicants' claim 1.

For the above reasons, Taira does not render obvious Applicants' claims 7-10.

- The Examiner rejected claim 12 under §103(a) as being unpatentable over Taira in view of US Patent 6,011,602 to Miyashita et al. (hereinafter Miyashita). Applicants respectfully traverse this rejection because the references fail to establish *prima facie* obviousness in that they fail to teach or suggest every element as set forth in Applicants' claims.

Claim 12 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. As noted above, Taira fails to teach or suggest this feature.

The Examiner cites Miyashita as teaching the use of convex prismatic structures shaped like a trapezoid in section.⁴ But Miyashita fails to teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. Instead, Miyashita teaches a light source 22 disposed on the side of a lighting apparatus 10 provided at the back of a liquid-crystal display panel 30. See Miyashita Fig. 1, and col. 10, lines 40-50.

Therefore, *arguendo*, even assuming that one of ordinary skill in the art were motivated to combine Taira and Miyashita as suggested by the Examiner, any such combination would still not teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel, as set forth in claim 12.

For the above reasons, Taira and Miyashita fail to render obvious claim 12.

⁴ Office Action at page 8, item 5, 4th paragraph.

- The Examiner rejected claims 3 and 4 under §103(a) as being unpatentable over Yuuki in view of US Patent 6,137,554 to Nakamura et al. (hereinafter Nakamura). Applicants respectfully traverse this rejection because the references fail to establish *prima facie* obviousness in that they fail to teach or suggest every element as set forth in Applicants' claims.

Each one of claims 3 and 4 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. As noted above, Yuuki fails to teach or suggest this feature.

The Examiner cites Nakamura as teaching a back lighted transmission LCD with at least one phase difference compensation layer.⁵ But Nakamura fails to teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. Instead, Nakamura teaches a back light 1 that provides light to the back of a liquid-crystal cell 400, 10. See Figs. 1 and 5, as well as col. 1, lines 10-15.

Therefore, *arguendo*, even assuming that one of ordinary skill in the art were motivated to combine Yuuki and Nakamura as suggested by the Examiner, any such combination would still not teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel, as set forth in claims 3 and 4.

For the above reasons, Yuuki and Nakamura fail to render obvious claims 3 and 4.

- The Examiner rejected claim 5 under §103(a) as being unpatentable over Yuuki in view of Nakamura and Taira. Applicants respectfully traverse this rejection because the references fail to establish *prima facie* obviousness in that they fail to teach or suggest every element as set forth in Applicants' claims.

⁵ Office Action at page 10, 2nd paragraph.

Claim 5 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. As noted above, the combination of Yuuki and Nakamura fails to teach or suggest this feature.

The Examiner cites Taira as teaching an LCD device wherein a reflection layer adheres to a surface of an optical path changing sheet on which optical path changing slopes are formed.⁶ But as noted above, Taira fails to teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel.

Therefore, *arguendo*, even assuming that one of ordinary skill in the art were motivated to combine Yuuki, Nakamura, and Taira, as suggested by the Examiner, any such combination would still not teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel, as set forth in claim 5.

For the above reasons, Yuuki, Nakamura, and Taira, fail to render obvious claim 5.

- The Examiner rejected claim 6 under §103(a) as being unpatentable over Yuuki in view of Nakamura and Taira, and further in view of US Patent 6,322,225 to Koike (hereinafter Koike). Applicants respectfully traverse this rejection because the references fail to establish *prima facie* obviousness in that they fail to teach or suggest every element as set forth in Applicants' claims.

Claim 6 sets forth a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. As noted above, the combination of Yuuki, Nakamura, and Taira, fails to teach or suggest this feature.

⁶ Office Action at page 12, paragraphs 3-5, and page 13, paragraphs 1-3.

The Examiner cites Koike as teaching the use of an adhesive that has a refractive index that is the same as that of the light scattering guide.⁷ But Koike fails to teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel. Instead, Koike teaches a light source L that is disposed on a side surface of a light scattering guide 1 which, in turn, is disposed behind a liquid-crystal panel 20. See Koike at: Fig. 3; col. 1, lines 10-17; and col. 8, line 60 - col. 9, line 8.

Therefore, *arguendo*, even assuming that one of ordinary skill in the art were motivated to combine Yuuki, Nakamura, Taira, and Koike as suggested by the Examiner, any such combination would still not teach or suggest a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, and a light source disposed on at least one side surface of said liquid-crystal display panel, as set forth in claim 6.

For the above reasons, Yuuki, Nakamura, Taira, and Koike, fail to render obvious claim 6.

Allowable Subject Matter

The Examiner indicated that claim 11 would be allowable if rewritten in independent form. However, because Applicants think that claim 1 is allowable as written, they have not rewritten claim 11 in independent form.

Conclusion

Claims 1 and 6 have been amended to remove informalities. Such amendments do not narrow the scope of the claims and, therefore, are not subject to the rule of the case in *Festo*.⁸ See also: *Turbocare Corp. v. General Electric Co.*, 60 USPQ.2d 1017 (Fed. Cir. August 29,

⁷ Office Action at page 14, 3rd paragraph.

⁸ *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558, 56 USPQ.2d 1865 (Fed. Cir. 2000) (*en banc*), *rev'd and remanded*, 2002 U.S. LEXIS 3818, *27 (May 28, 2002).

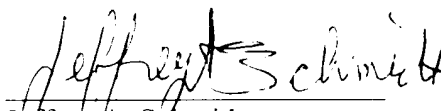
2001) (*Festo* is not applicable to a claim wherein a limitation is only redefined without narrowing the claim.).

Further, new claims 15-18 to further define the invention. New claims 15-18 depend from claim 1 and, therefore, should be allowable for at least the same reasons as set forth above with respect to claim 1.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Jeffrey A. Schmidt

Registration No. 41,574

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification has been changed as follows:

In the paragraph bridging pages 16 and 17, the following changes have been made:

Figs. 3A to 3E show examples of only one optical path changing means constituted by optical path changing slopes or prismatic structures as described above. In Figs. 3A to 3C, each of the optical path changing means A is shaped substantially like a triangle in section. In Figs. 3D and 3E, each of the optical path changing means A is shaped substantially like a [rectangle] trapezoid in section. In Fig. 3A, each of the optical path changing means A has optical path changing slopes A1 so as to be an isosceles triangle. In Fig. 3B, each of the optical path changing means A has an optical path changing slope A1, and a steep slope A2 having an inclination angle larger than that of the slope A1 with respect to a sheet plane. In Fig. 3C, each of the optical path changing sheet is provided as a repetitive structure of a plurality of optical path changing means A each constituted by an optical path changing slope A1 and a gentle slope A2 having an inclination angle smaller than that of the slope A1 with respect to the sheet plane. In Fig. 3C, a plurality of optical path changing means A are formed on the whole surface of one side of the sheet so that the means A are adjacently continued to one another. In Fig. 3D, each of the optical path changing means A is constituted by a convex portion (protrusion). In Fig. 3E, each of the optical path changing means A is constituted by a concave portion (groove).

IN THE CLAIMS:

The claims have been amended as follows:

1. (Amended) A liquid-crystal display device comprising:
a transmission type liquid-crystal display panel including a liquid-crystal cell;
a light source disposed on at least one side surface of said liquid-crystal display panel;
and
an optical path changing sheet disposed on a back side, opposite to a visual side, of said liquid-crystal display panel and having optical path changing slopes by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device.

6. (Amended) A liquid-crystal display device according to claim 5, wherein the refractive index difference is not larger than 0.10 [is] between said optical path changing sheet and said nearest liquid-crystal cell substrate, and a refractive index difference is not larger than 0.15 between said adhesive layer and said nearest liquid-crystal cell substrate.

12. (Amended) A liquid-crystal display device according to claim 7, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave or convex portion shaped like a [rectangle] trapezoid in section and having two or more optical path changing slopes facing said light source.

New claims 15-18 have been added.